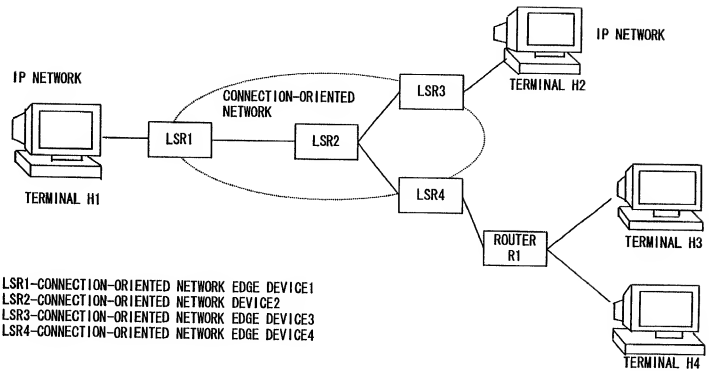


FIG. 1

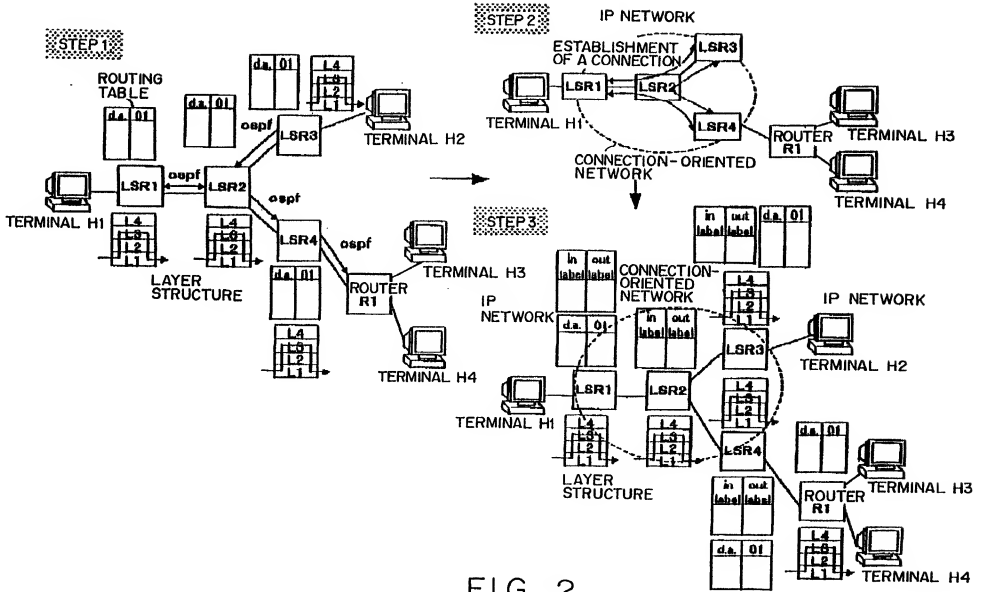


FIG. 2

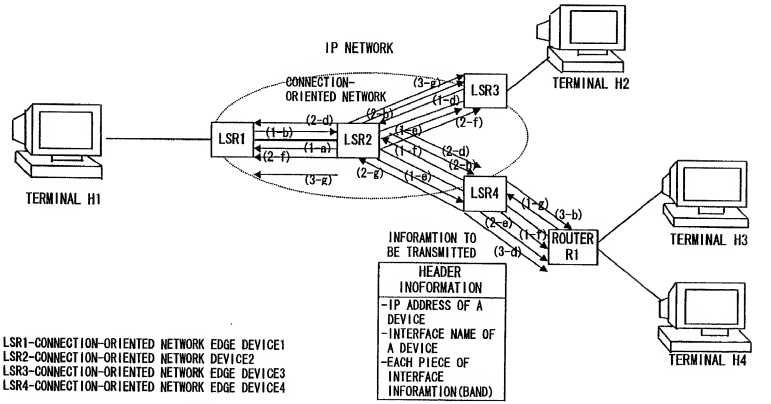


FIG. 3

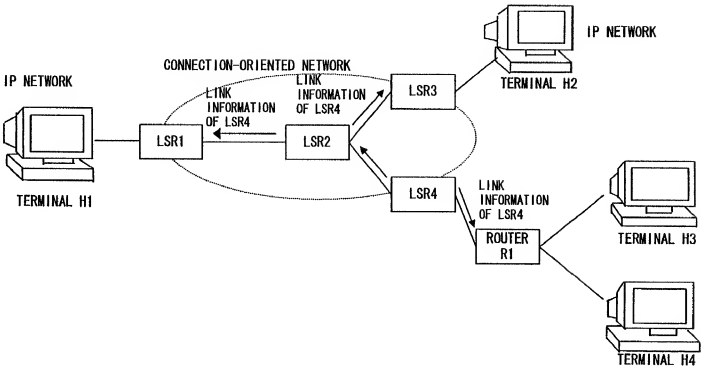


FIG. 4

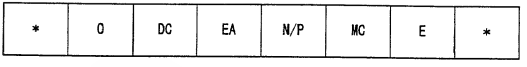


FIG. 5A

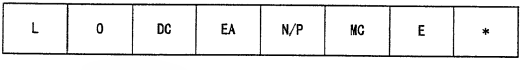


FIG. 5B

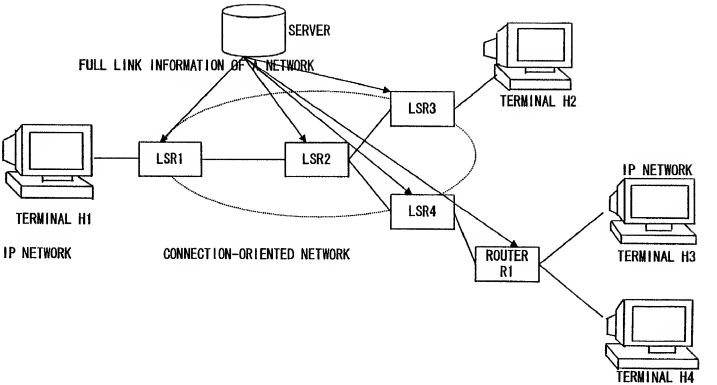


FIG. 6

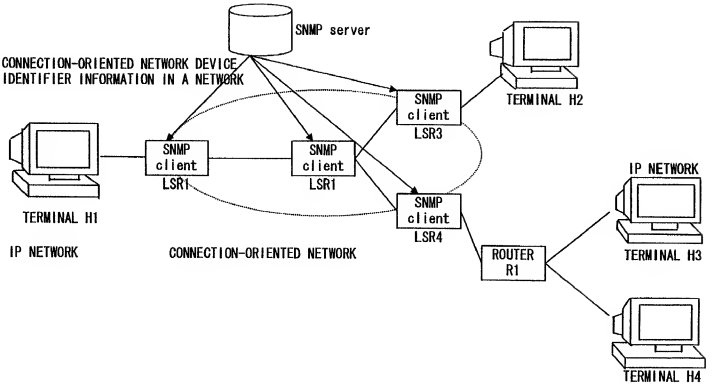


FIG. 7

*	0	DC	EA	N/P	MC	E	R

THE OPTIONS FIELD

FIG. 8

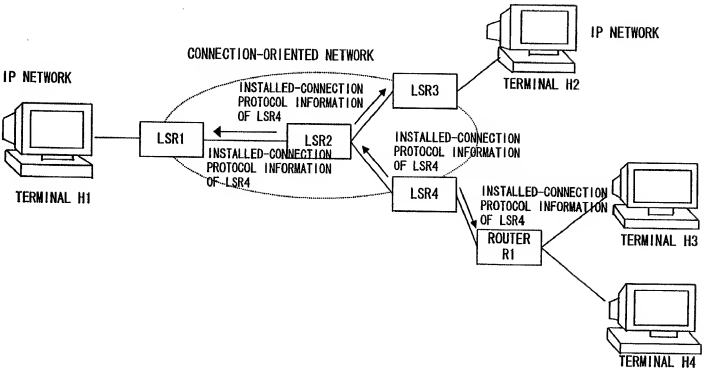


FIG. 9

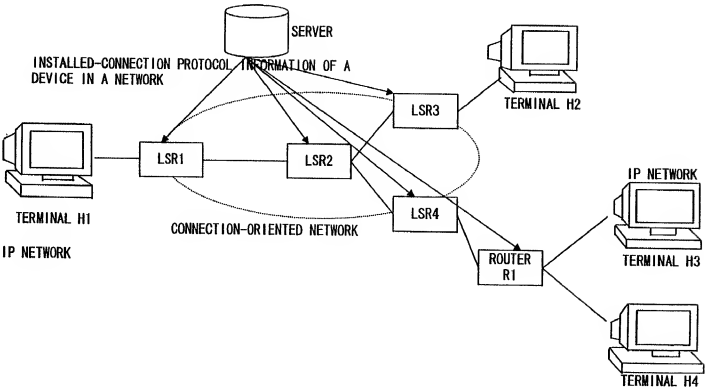


FIG. 10

DEVICE(INTERFACE) ADDRESS	CONNECTION-ORIENTED NETWORK DEVICE IDENTIFIER	CONNECTION PROTOCOL IDENTIFIER
10.0.0.1	○	○
10.25.1.1	○	×
...	...	...

FIG. 11

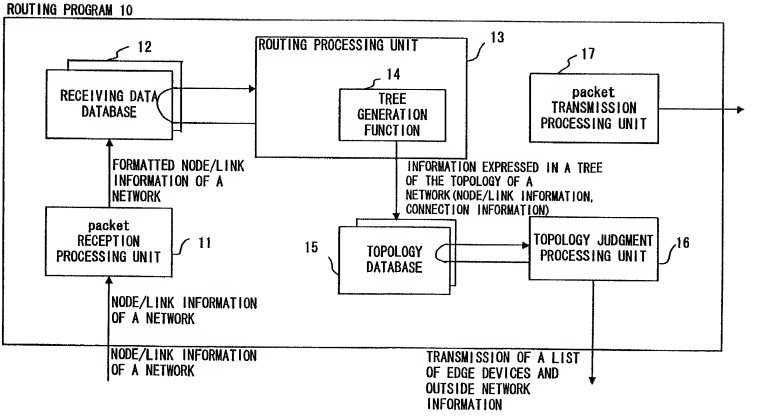


FIG. 12

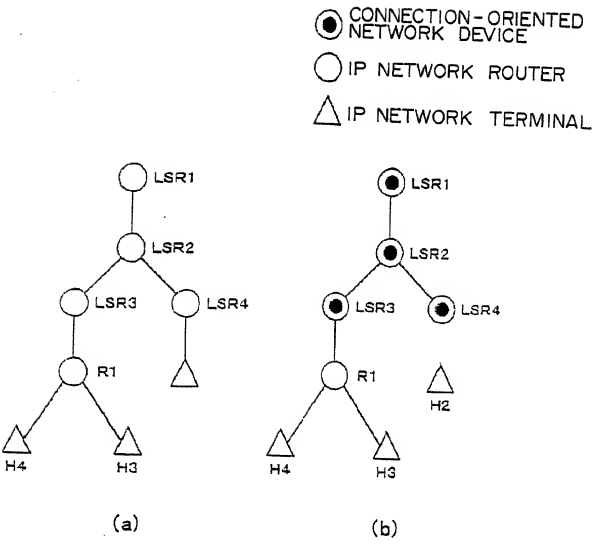


FIG. 13

```
/*initialization*/
DESIGNATES A SELF-NODE AS THE ROOT OF A TREE.
current_pointer=SELF NODE
/*spf rouine from here*/
spf_routine()
[
 while(1)[
        SEARCHES FOR LINK INFORMATION ADJACENT (RELATED) TO current_pointer
        IF(A NEW ENTRY IS DETECTED.)[
                ADDS THE NEW ENTRY TO THE TREE.
                IF(L/R BITS OF THE LINK INFORAMTION OF AN ENTRY "option header" BOTH ARE ON)[  .....(1)
                      THE DEVICE IS A VALID CONNECTION-ORIENTED NETWORK DEVICE
                      (THE INFORMATION IS INTERNALLY STORED).
                ]
                current_pointer=NODE OF A NEW ENTRY
        IF(THERE IS NO ENTRY.)[
                current_pointer=ONE-RANK HIGHER NODE
                IF(current_pointer=null)[
                        rrturn(0)+ /*THE SEARCH IS COMPLETED. EXITS THE ALGORITHM. */
                ]
        ]
  ]
]
```

FIG. 14

```
/*initialization*/
int traced []          /*CHECKS WHETHER ALL POSITIONS ARE CHEDCKED (CHECKED=1,
UNCHECKED=0)*/
int *current_pointer=LSR1  /*INITIALIZES THE CURRENT POSITION IN THE TREE.*/
char edge_entry []      /*EDGE DEVICE ENTRY*/
int edge_entry_number /*TOTAL NUMBER OF EDGE DEVICE ENTRIES*/

/*SEARCH ROUTINE*/
search(){
  while(1){
        VIEWS THE CHILD OF A DEVICE POINTED TO BY current_pointer.
        IF(traced[child]=0){
                current_pointer=child; /*MOVES TO AN UNCHECKED CHILD*/
                traced[child]=1;
        }

  ELSE IF(ALL CHILDREN ARE CHECKED.){
                current_pointer=parent /*MOVES TO THE PARENT*/
                IF(parent=null){
                      break;          /*THE SEARCH IS COMPLETED.*/
                }
                 continue;
     }
     /*JUDGES WHETHER IT IS AN EDGE DEVICE.*/
     IF(L BIT POINTED TO BY current_pointer is zero.){
              edge_entry[edge_entry_number]=parent DEVICE;
              ++edge_entry_number;
              current_pointer=parent;
     }
  }
  return(0);
}
```

FIG. 15

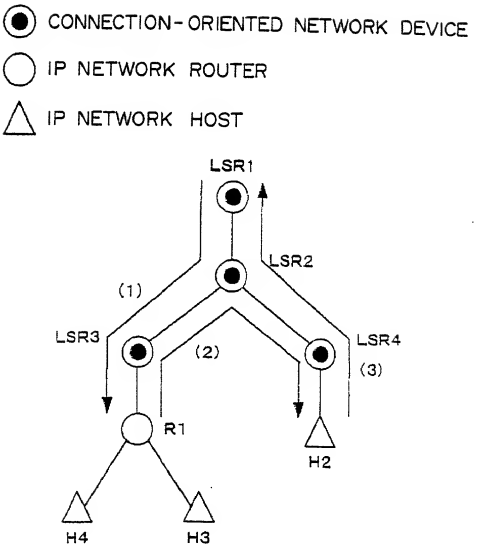

CONNECTION-ORIENTED NETWORK DEVICE
IP NETWORK ROUTER
IP NETWORK HOST
LSR1
LSR2
(1)
LSR3
(2)
LSR4
(3)
R1
H2
H4
H3

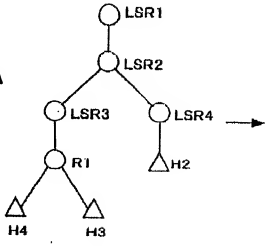
FIG. 16

EDGE DEVICE ENTRIES STORED IN LSR1

EDGE DEVICE
LSR3
LSR4

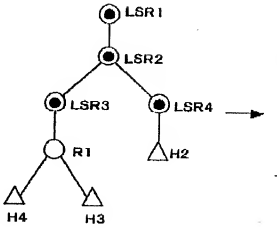
FIG. 17

FIG. 18A



destination address(d.a.)	next hop outgoint interface(OI)

FIG. 18B



destination address(d.a.)	egress LSR IP address	next hop (outgoint interface(OI)

```
/*initialization*/
int traced []          /*CHECKS WHETHER ALL POSITIONS ARE CHECKED (CHECKED=1, UNCHECKED=0)*/
int *current_pointer=LSR1 /*INITIALIZES THE CURRENT POSITION IN THE TREE.*/
char edge_entry []     /*EDGE DEVICE ENTRY*/
int edge_entry_number /*TOTAL NUMBER OF EDGE DEVIE ENTRIES*/
/*SERCH ROUTINE*/
search() {
  while(1) [
          VIEWS THE child OF A DEVICE POINTED TO BY current_pointer.
          IF(traced[child]=0) {
                  current_pointer=child: /*MOVES TO AN UNCHECKED CHILD.*/
                  traced[child]=1:
          }
  ELSE IF(ALL CHILDREN ARE CHECKED.) [
                  current_pointer=parent /*MOVES TO THE parent/*
                  IF(parent=null) {
                        break:          /*THE SEARCH IS COMPLETED.*/
                  ]
                  continue:
          }

          /*JUDGES WHETHER IT IS AN EDGE DEVICE.*/
          IF(L BIT POINTED TO BY current_pointer IS ZERO.) {
                   edge_entry[edge_entry_number]=parent DEVICE:
                   ++edge_entry number:
          }
          /*ADDS AN ENTRY OF A NETWORK CONNECTED TO AN EDGE DEVICE.*/
          IF(L BIT POINTED TO BY current_pointer IS ZERO.) {
                   RELATES THE ip address POINTED TO BY curren_pointer TO
                   edge_entry[edge_entry_number](ENTRY ADDITION):
          ]
  }
  return(0):
]
```

FIG. 19

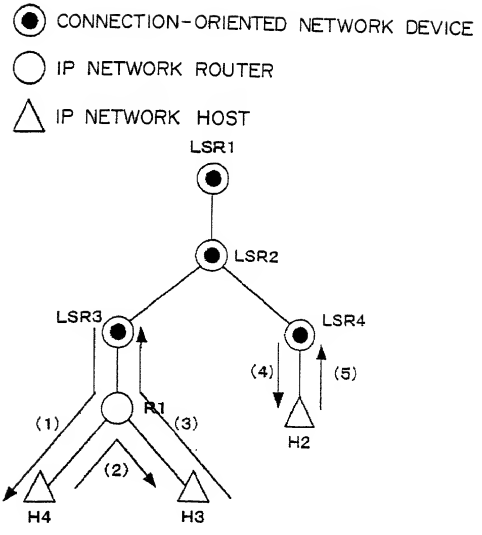


FIG. 20

ENTRY OF EDGE DEVICE/OUTSIDE NETWORK INFORMATION STORED IN LSR1

EDGE DEVICE	OUTSIDE NETWORK
LSR3	R1
LSR3	H4
LSR3	H3
LSR4	H2

FIG. 21

routing_table_request object
OBJECT INSERTED IN A PATH MESSAGE. IF SENDER(ENTRANCE EDGE DEVICE) WANTS TO OBTAIN THE ROUTING TABLE OF AN EXIST EDGE DEVICE, routing_table_request object IS INCLUDED IN THE PATH MESSAGE.

routing_table object
ON RECEIPT OF THE PATH MESSAGE, INCLUDING THE routing_table_request object, AN EXIT EDGE DEVICE RETURNS AN RESV MESSAGE, INCLUDING THE routing_table object, TO THE SENDER. THE file OF THE routing table IS COPIED INTO THE routing_table object AND IS TRANSMITTED.

FIG. 22

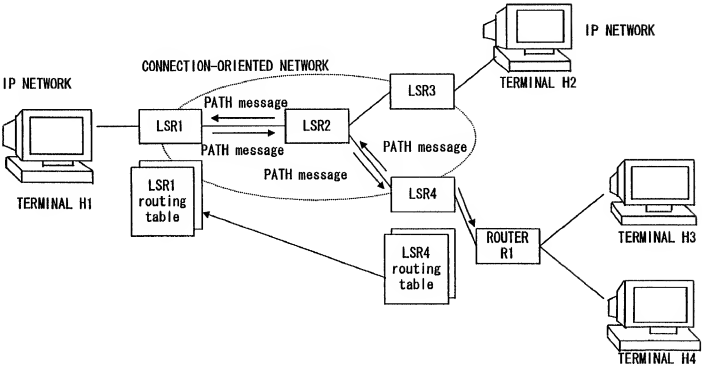


FIG. 23

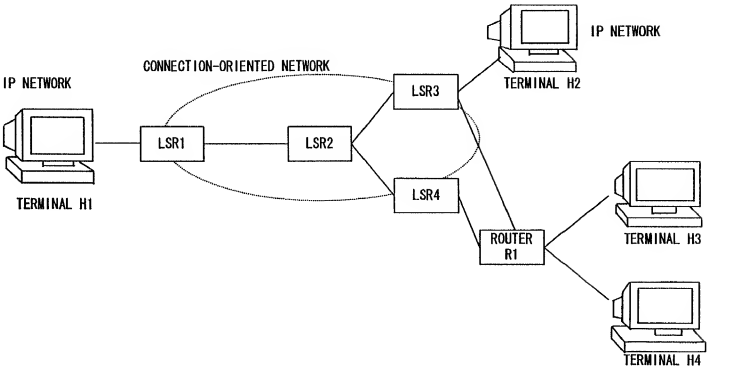


FIG. 24

FEC					label
d.a.	s.a.	d.p.	s.p.	proto	
10.0.0.1	. . . .	1000	. . . .	. . . .	50
10.0.0.1	. . . .	1050	. . . .	. . . .	60
20.0.0.0	. . . .	. . . .	. . . .	. . . .	100

d.a. =destination IP address, s.a.=source IP address
d.p. =destination port, s.p.=source port
proto=protocol ID, ···=no-designation

FIG. 25

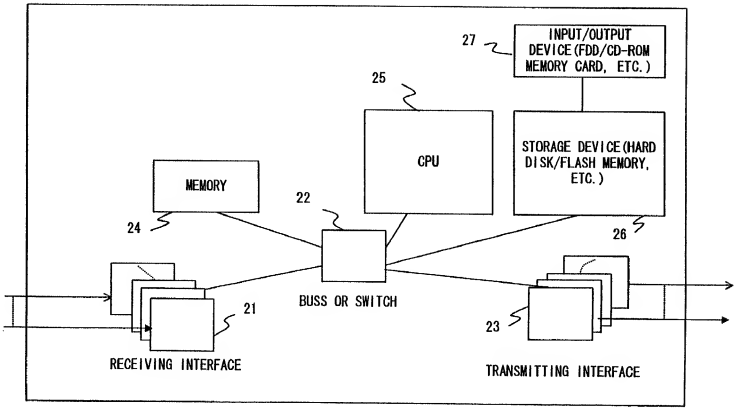


FIG. 26